

Claims:**What is claimed is:**

1. A humidity control system for supplying either one of a dehumidified first air stream and a humidified second air stream to an indoor space and for discharging the other air stream to an outdoor space, wherein:

(i) the humidity control system comprises:

a refrigerant circuit (60) which includes first and second adsorbent-supported heat exchangers (61, 62) which are fluidly connected in the refrigerant circuit (60) to perform a refrigeration cycle, and which is capable of reversing the circulation direction of refrigerant;

a casing (11) internally having an air passageway in which the heat exchangers (61, 62) are disposed; and

a switching mechanism for changing the distribution route of air in the casing (11) depending on the circulation direction of refrigerant in the refrigerant circuit (60) so that the first air stream is passed through one of the heat exchangers (61, 62) that is functioning as an evaporator while the second air stream is passed through the other heat exchanger that is functioning as a condenser; and

(ii) a compressor (63), an expansion mechanism (65), and a reversal mechanism (64) for reversing the circulation direction of refrigerant in the refrigerant circuit (60) are disposed together with the heat exchangers (61, 62) in the casing (11).

2. The humidity control system of claim 1, wherein the compressor (63) is disposed in a space partitioned from the internal air passageway of the casing (11).

3. The humidity control system of claim 1, wherein the compressor (63) is disposed in the internal air passageway of the casing (11).

4. The humidity control system of any one of claims 1-3, wherein, in the casing

(11), an outlet opening (24) and an inlet opening (22) are opened to provide fluid connection with ducts (72, 74) in fluid communication with the indoor space and an outlet opening (23) and an inlet opening (21) are opened to provide fluid connection with ducts (71, 73) in fluid communication with the outdoor space.

5. The humidity control system of any one of claims 1-3, wherein, in the casing (11), an outlet opening (24) and an inlet opening (22) are opened to provide direct fluid communication between the casing (11) and the indoor space and an outlet opening (23) and an inlet opening (21) are opened to provide fluid connection with ducts (71, 73) in fluid communication with the outdoor space.

6. The humidity control system of claim 1, wherein:

the humidity control system includes an air supplying fan (25) and an air exhausting fan (26) which are disposed in the casing (11);

the casing (11) is shaped like a box;

the casing (11) has an internal space which is divided into a first space (17) defined along a fan side lateral plate (13) as a lateral plate of the casing (11), and a remaining second space (18); and

the air supplying fan (25) and the air exhausting fan (26) are disposed in the first space (17) and the first and second heat exchangers (61, 62) and the switching mechanism are disposed in the second space (18).

7. The humidity control system of claim 6, wherein the compressor (63) of the refrigerant circuit (60) is disposed between the air supplying fan (25) and the air exhausting fan (26) in the first space (17) of the casing (11).

8. The humidity control system of claim 6, wherein the first and second heat exchangers (61, 62) are so arranged as to allow passage of air in the thickness direction of the

casing (11).

9. The humidity control system of claim 6, wherein the first and second heat exchangers (61, 62) are so arranged as to allow passage of air in a direction perpendicular to the thickness direction of the casing (11).

10. The humidity control system of claim 6, wherein the air supplying fan (25) and the air exhausting fan (26) are each formed by a respective multi-blade fan which is configured to draw in air from a lateral side of a fan casing thereof and then deliver it forward and which is disposed such that the center of axle of its impeller is oriented in the thickness direction of the casing (11).

11. The humidity control system of claim 10, wherein:

an air supplying opening (24) and an inside air inlet opening (22) which are in fluid communication with the indoor space are provided in one of lateral plates (14, 15) of the casing (11) which are orthogonal to the fan side lateral plate (13), and an air exhausting opening (23) and an outside air inlet opening (21) which are in fluid communication with the outdoor space are provided in the other of the lateral plates (14, 15);

in the second space (18), (i) a first heat exchange chamber (41) in which the first heat exchanger (61) is accommodated and a second heat exchange chamber (42) in which the second heat exchanger (62) is accommodated are defined adjacently side by side in a direction orthogonal to the fan side lateral plate (13) and (ii) a first inflow path (43) for the inflow of air and a first outflow path (44) for the outflow of air are provided which extend along one of continuous lateral surfaces of the two heat exchange chambers (41, 42) and which are superimposedly arranged in the thickness direction of the casing (11) and a second inflow path (45) for the inflow of air and a second outflow path (46) for the outflow of air are provided which extend along the other of the continuous lateral surfaces of the two heat exchange chambers (41, 42) and which are superimposedly arranged in the thickness direction

of the casing (11); and

the outflow paths (44, 46) are in fluid communication with the first space (17) through fan side communication openings (75, 76).

12. The humidity control system of claim 10, wherein:

an air supplying opening (24) in fluid communication with the indoor space and an air exhausting opening (23) in fluid communication with the outdoor space are provided in the fan side lateral plate (13) of the casing (11) and an inside air inlet opening (22) and an outside air inlet opening (21) are provided in a lateral plate (12) opposite the fan side lateral plate (13);

in the second space (18), (i) a first heat exchange chamber (41) in which the first heat exchanger (61) is accommodated and a second heat exchange chamber (42) in which the second heat exchanger (62) is accommodated are defined adjacently side by side in the longitudinal direction of the fan side lateral plate (13) and (ii) between one of continuous lateral surfaces of the two heat exchange chambers (41, 42) and the lateral plate (12) opposite the fan side lateral plate (13) a first inflow path (43) for the inflow of air and a second inflow path (45) for the inflow of air are provided which extend along the lateral plate (12) and which are superimposedly arranged in the thickness direction of the casing (11) and between the other of the continuous lateral surfaces of the two heat exchange chambers (41, 42) and the fan side lateral plate (13) a first outflow path (44) for the outflow of air and a second outflow path (46) for the outflow of air are provided which extend along the fan side lateral plate (13) and which are superimposedly arranged in the thickness direction of the casing (11); and

the outflow paths (44, 46) are in fluid communication with the first space (17) through fan side communication openings (75, 76).

13. The humidity control system of either claim 11 or 12, wherein:

the air supplying fan (25) is arranged such that a fan inlet opening (27), provided in

the lateral side of the fan casing of the air supplying fan (25), faces either one of the fan side communication openings (75, 76); and

the air exhausting fan (26) is arranged such that a fan inlet opening (28), provided in the lateral side of the fan casing of the air exhausting fan (26), faces the other of the fan side communication openings (75, 76).

14. The humidity control system of claim 6, wherein the expansion mechanism (65) and the reversal mechanism (64) for reversing the circulation direction of refrigerant in the refrigerant circuit (60) are disposed in the first space (17) of the casing (11).

15. The humidity control system of claim 14, wherein a piping arrangement of the refrigerant circuit (60) for fluid connection with the first and second heat exchangers (61, 62) is provided along a top plate of the casing (11).

16. The humidity control system of claim 1, wherein the humidity control system includes an outdoor filter (124) which is arranged and formed along both an outside-air inflow surface of the first heat exchanger (61) and an outside-air inflow surface of the second heat exchanger (62).

17. The humidity control system of claim 16, wherein:

a first passageway (41) in which the first heat exchanger (61) is disposed and a second passageway (42) in which the second heat exchanger (62) is disposed are formed in the casing (11); and

the outdoor filter (124) comprises a first filter part (124a) disposed in the first passageway (41) and a second filter part (124b) disposed in the second passageway (42).

18. The humidity control system of claim 17, wherein:

in the outdoor filter (124), the first filter part (124a) and the second filter part (124b)

are integral with each other; and

the outdoor filter (124) is arranged such that it extends over both the outside-air inflow surface of the first heat exchanger (61) and the outside-air inflow surface of the second heat exchanger (62).

19. The humidity control system of claim 18, wherein, in the casing (11), the first heat exchanger (61) and the second heat exchanger (62) are disposed adjacently to each other and the inflow surface of the first heat exchanger (61) and the inflow surface of the second heat exchanger (62) lie on approximately the same plane.

20. The humidity control system of claim 16, wherein the casing (11) is provided with a take-out opening (161) from which the outdoor filter (124) can be taken out.

21. The humidity control system of claim 17, wherein the humidity control system is operable to switch its operation between:

a first operation in which outside air is distributed first through the first filter part (124a) and then through the first heat exchanger (61) and is thereafter supplied to the indoor space while simultaneously room air is distributed first through the second heat exchanger (62) and then through the second filter part (124b) and is thereafter discharged to the outside space; and

a second operation in which outside air is distributed first through the second filter part (124b) and then through the second heat exchanger (62) and is thereafter supplied to the indoor space while simultaneously room air is distributed first through the first heat exchanger (61) and then through the first filter part (124a) and is thereafter discharged to the outdoor space.

22. The humidity control system of claim 17, wherein:

the humidity control system includes an indoor filter (123b) which is disposed in a

passageway through which room air is made to flow into either of the first or the second passageways (41, 42); and

the humidity control system is operable to switch its operation between:

a first operation in which outside air is distributed first through the first filter part (124a) and then through the first heat exchanger (61) and is thereafter supplied to the indoor space while simultaneously room air is distributed first through the indoor filter (123b), then through the second heat exchanger (62), and then through the second filter part (124b) and is thereafter discharged to the outside space; and

a second operation in which outside air is distributed first through the second filter part (124b) and then through the second heat exchanger (62) and is thereafter supplied to the indoor space while simultaneously room air is distributed first through the indoor filter (123b), then through the first heat exchanger (61), and then through the first filter part (124a) and is thereafter discharged to the outdoor space.

23. The humidity control system of either claim 1 or 16, wherein:

a first passageway (41) in which the first heat exchanger (61) is disposed, a second passageway (42) in which the second heat exchanger (62) is disposed, and a room-air supplying passageway through which room air is made to flow into either of the first or the second passageways (41, 42) are formed in the casing (11); and

the humidity control system includes an indoor filter (123b) which is disposed in the room-air supplying passageway.

24. The humidity control system of either claim 1 or 16, wherein:

a first passageway (41) in which the first heat exchanger (61) is disposed and a second passageway (42) in which the second heat exchanger (62) is disposed are formed in the casing (11); and

the humidity control system includes:

a suction opening (163) which faces the indoor space by being in fluid connection

with an air passageway which is located nearer to the indoor space than the first and second passageways (41, 42) in the casing (11); and

an indoor filter (123b) which is disposed in the vicinity of an opening part of the suction opening (163).

* * * * *